RCMOS – Multidisciplinary Scientific Journal The Knowledge.
ISSN: 2675-9128. São Paulo-SP.
Year VI, v.1 2026. | Submission: 06/02/2026 | Accepted: 08/02/2026 | Publication: 10/02/2026

Profile of cholecystectomy surgeries performed in a public hospital in the District. Federal: Factors associated with the choice between open and videolaparoscopic techniques.

Profile of cholecystectomy surgeries performed in a public hospital in the Federal District: factors associated with the choice between open and videolaparoscopic techniques

Marina Ferreira da Silva – Hospital de Base do Distrito Federal, marinaferreiraffs@gmail.com | https://orcid.org/0000-0002-0357-2982

Joéle Maria de Moraes Mesquita Melo – Hospital de Base do Distrito Federal, joele@uol.com.br

Lucas Ferreira Aires Mendonça – Hospital de Base do Distrito Federal, Lucas.fam20@gmail.com

Ana Flávia Moreira E Silva Coelho – Hospital de Base do Distrito Federal, Moreira.anaflavia@gmail.com

Isamara Monteiro – Hospital de Base do Distrito Federal, isamaramonteiro31@gmail.com

Summary

Cholecystectomy is one of the most frequently performed surgical procedures in Brazil, primarily indicated for the treatment of cholelithiasis and its complications. Although videolaparoscopy is considered the gold standard due to its lower pain and faster recovery, the choice of technique can be influenced by clinical and institutional factors, especially in public hospitals. This study analyzed the profile of cholecystectomies performed in a public hospital in the Federal District and the factors associated with the choice between open and videolaparoscopic techniques. This is a cross-sectional, descriptive study, analyzing the medical records of patients operated on between March 2023 and February 2025. 308 patients were evaluated, with an average of 12.8 procedures per month. The open technique predominated (60.4%), followed by videolaparoscopy (36.7%), with a conversion rate of 2.9%. Elective (49.4%) and emergency (50.6%) surgeries occurred in similar proportions. There was a higher concentration among those aged 40–59 years (44.9%) and a predominance of females (79.5%). The main indication was cholecystitis (55.3%). Complications occurred in 12.4% of cases, being less frequent in videolaparoscopy (~5%) compared to open surgery (~15%) and conversions (~33%). The postoperative hospital stay was up to two days in 71% of patients, and the hospital discharge rate was 94.8%, with a mortality rate of 2.9%. It is concluded that the open technique remained predominant, especially in more complex cases, while videolaparoscopy presented better clinical outcomes.

Keywords: Cholecystectomy. Laparoscopic cholecystectomy. Epidemiology.

Abstract

Cholecystectomy is one of the most frequently performed surgical procedures in Brazil, mainly indicated for the treatment of cholelithiasis and its complications. Although laparoscopic surgery is considered the gold standard due to reduced postoperative pain and faster recovery, the choice of technique may be influenced by clinical and institutional factors, particularly in public hospitals. This study aimed to analyze the profile of cholecystectomy performed in a public hospital in the Federal District of Brazil and to identify factors associated with the choice between open and laparoscopic techniques. This was a cross-sectional, descriptive study based on the review of medical records of patients operated on between March 2023 and February 2025. A total of 308 patients were included, with a mean of 12.8 procedures per month. Open surgery predominated (60.4%), followed by laparoscopic cholecystectomy (36.7%), with a

conversion rate of 2.9%. Elective (49.4%) and urgent (50.6%) procedures occurred in similar proportions. Most patients were aged 40–59 years (44.9%), with a predominance of females (79.5%). Acute cholecystitis was the main surgical indication (55.3%). Overall complications occurred in 12.4% of cases, being less frequent in laparoscopic procedures (~5%) compared to open surgery (~15%) and converted cases (~33%). Postoperative hospital stay was up to two days in 71% of patients. The discharge rate was 94.8%, and mortality was 2.9%. In conclusion, open surgery remained predominant, particularly in more complex cases, while laparoscopy was associated with better clinical outcomes.

Keywords: Cholecystectomy. Cholecystectomy, Laparoscopic. Epidemiology.

1. Introduction

Cholecystectomy is one of the most frequently performed surgical procedures. worldwide, it is primarily indicated for the treatment of symptomatic cholelithiasis and its... complications (Warchaÿowski et al., 2020; Morales-Maza et al., 2021). Since the end of the decade In 1980, with the introduction of the videolaparoscopic technique, a change was observed. significant in the surgical paradigm, being gradually adopted as the gold standard in many services, due to less invasiveness, faster recovery and lower rates of postoperative complications when compared to the open technique (Warchaÿowski et al., 2020; Nassar et al., 2021).

Despite the widespread use of laparoscopic cholecystectomy, the open technique is still... It is performed in specific clinical and structural contexts, especially in hospitals. public and in emergency situations (Lio et al., 2022). The choice between one approach or Other factors may depend on multiple factors, such as the patient's clinical profile, the severity of the condition, associated comorbidities, availability of trained staff, hospital infrastructure and Institutional health policies (Hanson-Viana et al., 2022). In this sense, surgical practice It reveals itself as a dynamic field, in which technical decisions are influenced by factors. individual and systemic.

Smiley et al. (2023) address the growing interest in ensuring safe access and timely for surgery in the developing world, with special emphasis on videolaparoscopy. This surgical technique has proven advantageous by providing shorter recovery times. shorter compared to open surgery. Furthermore, complications related to the incisions, Common issues in open-source technology can have more severe personal and financial impacts in countries where... low and middle income. Laparoscopic surgery, by requiring smaller incisions, reduces the risks of hernia, infection, and wound dehiscence, reinforcing its importance as an essential component. of contemporary global health.

RCMOS - Multidisciplinary Scientific Journal The Knowledge.
ISSN: 2675-9128. São Paulo-SP.

In this context, Warchaÿowski et al. (2020) highlight the importance of identification.
of preoperative factors associated with conversion from videolaparoscopy to open surgery,
such as age, sex, associated diseases, acute cholecystitis, and the presence of inflammation, for
to increase patient safety and treatment effectiveness. Despite this, there is still no...
There is consensus in the literature regarding all these predictive factors. Lio et al. (2022) reinforce that the
Early identification of these factors can improve surgical decision-making and reduce risks.
complications associated with conversion, which in turn increase morbidity and mortality.

Given this, the present study proposes an analysis of the current scenario of
cholecystectomies performed in a public hospital in the Federal District, focusing on
Specifics involved in choosing between open and videolaparoscopic techniques. The research
part of the observation of the coexistence of these two approaches in the hospital context, even
Given the consolidation of videolaparoscopy as the preferred technique in several centers.

Research can contribute to improving the quality of healthcare provided to the population served
by the Unified Health System (SUS), especially in a
public hospital in the Federal District. When analyzing the profile of cholecystectomy surgeries and the
Factors influencing the choice between open and videolaparoscopic techniques, research
This allows you to map situations that increase the risk of conversion and complications. This information
They can support the formulation of strategies to optimize resources and reduce the time of
hospitalization and improve clinical outcomes, promoting safer, more efficient care and
equitable.

For healthcare professionals, especially surgeons, the results can offer...
subsidies for clinical decision-making and for safer surgical planning and
efficient. In addition, it allows for the identification of patterns and bottlenecks in service, helping to
in the implementation of evidence-based care protocols adapted to reality.
of the public service.

From an academic standpoint, the research fills a gap in the literature by analyzing
a contextualized profile of cholecystectomies performed in a public hospital
Brazilian study focusing on variables associated with the choice of surgical approach.
It strengthens the field of applied research in public health and general surgery by providing data.
which can serve as a basis for new investigations, development of predictive models of
Conversion and evaluation of clinical outcomes in different hospital settings.

In this context, the study's general objective was to analyze the profile of surgeries of
Cholecystectomy performed in a public hospital in the Federal District, identifying the factors
associated with the choice between open and videolaparoscopic techniques. And as objectives

Specifics: describe the sociodemographic and clinical characteristics of the patients undergoing treatment. to cholecystectomy; identify the frequency of surgeries performed using open and closed techniques. videolaparoscopy; analyze the clinical, anatomical, and institutional factors related to conversion from videolaparoscopy to open technique; assessing the main complications. associated with each technique; and compare the length of hospital stay between patients undergoing open and videolaparoscopic surgery.

2. Materials and Methods

The study is characterized as a descriptive cross-sectional study with a quantitative approach, with the Data collection performed on the medical records of patients undergoing cholecystectomy surgery. in a public hospital in the Federal District between March 2023 and February 2025, having been approved by the Research Ethics Committee (CEP) of the Teaching and Research Foundation in Health Sciences (FEPECS) (CAAE no. 91880625.9.0000.5553, Opinion no. 8.037.618, dated 8 of December 2025). A retrospective analysis of the medical records was performed.

Data collection was carried out through the analysis of medical records of patients undergoing these surgical procedures, using information such as data sociodemographic characteristics (age, sex, color/race, geographic origin), clinical characteristics (clinical diagnosis, presence of comorbidities, duration of symptoms, prior use) (antibiotics), details of the surgical procedure (videolaparoscopic technique or surgery) open, conversion), anatomical and intraoperative variables (presence of adhesions; Perivesicular inflammation/infiltration; thickening of the gallbladder wall; difficulty in Visualization of Calot's triangle; biliary tract injury; need for drainage) and outcomes. immediate postoperative period (complications, length of hospital stay, need for reintervention, Clinical evolution, hospital readmission within 30 days).

The participants in the study were patients who had undergone cholecystectomy surgery. in a public hospital in the Federal District between March 2023 and February 2025, selected retrospectively from the hospital's medical records.

The sample consisted of 308 patients. It should be noted that the following were identified: Initially, 315 cholecystectomy procedures were performed at the hospital during the period of From March 2023 to February 2025, however, 7 patients had inconsistencies in... medical records, with the decision to exclude them. It is, therefore, a census sample, representing all available cases that met the inclusion criteria, which provides robustness and representativeness of the results. The recruitment was done retrospectively and not

invasive, based on the identification of the medical records of patients who underwent cholecystectomy during the study period.

The study included patients over 18 years of age who underwent cholecystectomy surgery. in a public hospital in the Federal District between March 2023 and February 2025; Complete and legible medical records containing sociodemographic, clinical and... related to the surgical procedure. And it excluded those patients who underwent Cholecystectomy due to a previous diagnosis of neoplasia.

The statistical analysis of the study was descriptive in nature, with the aim of characterizing The epidemiological profile of patients undergoing cholecystectomy surgery in a hospital. The data collected was from the public sector of the Federal District between March 2023 and February 2025. Organized in tables and graphs, allowing for a clear and informative presentation. The Categorical variables were described in absolute and relative frequencies (as percentages). while continuous variables were analyzed using measures of central tendency and Dispersion, such as mean, median, standard deviation, minimum and maximum values.

The potential risk associated with participating in the research was the possible disclosure of the risk. accidental falsification of participants' identities. To mitigate this risk, we have adopted measures such as Anonymization of the collected data through encoding, without any identification. Nominal data were collected and presented only in aggregate form in the results. No data was collected. sensitive information such as name, address, phone number, identity documents, medical record number or any other data that could allow direct identification of participants. Furthermore, the data will be stored exclusively on a computer. protected by a personal password, in a spreadsheet with encrypted protection, accessible only to The researcher in charge and the team directly involved in the research. This approach is in accordance with Resolution No. 466/2012, which ensures secrecy and confidentiality of research participants and their data.

The research offers benefits to public health by contributing to understanding. of the epidemiological profile of cholecystectomy surgeries in a public hospital, allowing to identify factors that influence the choice between videolaparoscopic technique and surgery. open. This analysis allows for the identification of clinical, anatomical, and institutional patterns. associated with the conversion of techniques and postoperative complications, supporting strategies to improve surgical decision-making and care planning. Furthermore, by By providing data on outcomes and lengths of stay, the study can guide policies. more efficient allocation of resources, optimizing hospital flows and contributing to the

Improvement of clinical practices, with a direct impact on the quality of care and in patient recovery.

3. Results

This section describes the main findings of the research regarding the profile of patients undergoing cholecystectomy at a public hospital in the Federal District during the period from March 2023 to February 2025. Considering the total period analyzed, which Over a period of 24 months, 308 cholecystectomies were performed, corresponding to an average of globally, approximately 12.8 procedures per month. When analyzing the years separately, An average of 12.7 surgeries were observed per month in 2023 (considering 10 months), 12.8 surgeries in 2024 and 13.5 surgeries in 2025 (considering the first two months of the year), indicating Stability in the volume of care throughout the period.

The age distribution of patients revealed a higher concentration of procedures among... Middle-aged adults. The 50–59 age group (23.1%) and the 40–49 age group stand out particularly. years (21.8%), which together account for almost half of the cases, followed by the 30–39 age group. years (16.2%) (Table 1).

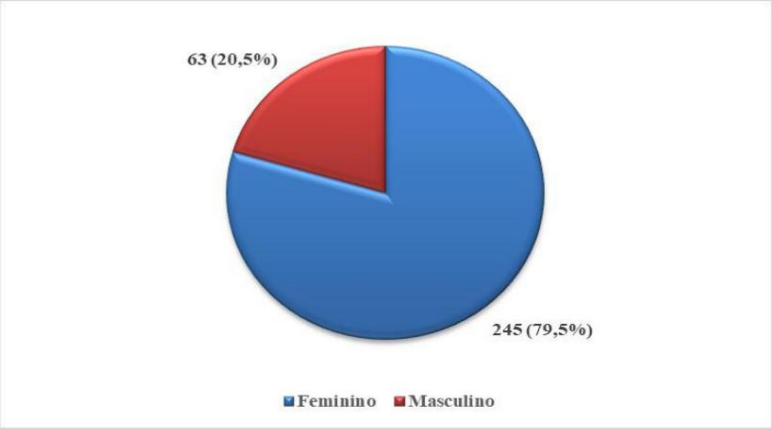
Table 1. Distribution of patients by age group.

Age Range Frequency (n)	Percentage (%)
ÿ 19 years 20– 4	1.3%
29 years 47 30–39 years	15.3%
50 40–49 years 67 50–59	16.2%
years 71 60–69 years 47	21.8%
70–79 years 15 80–89	23.1%
years 6 ÿ 90 years 1	15.3%
Source: Prepared by the	4.9%
authors (2025).	1.9%
	0.3%

The extreme age groups were least represented, with 1.3% of them. cases among individuals ÿ19 years old and only 0.3% in the population ÿ90 years old, a pattern expected for the Epidemiology of cholelithiasis (Table 1). This behavior confirms that most of the Cholecystectomies occur between the ages of 30 and 59, a period in which hormonal and metabolic factors... Dietary habits tend to favor the formation of gallstones. The distribution of

The distribution of patients by sex is illustrated in Graph 1.

Figure 1. Distribution of patients by sex.



Source: Prepared by the authors (2025).

The distribution by sex showed a significant predominance of women among the patients. submitted to cholecystectomy, representing 79.5% of the total. This pattern is aligned with the Epidemiology of cholelithiasis, which has a higher prevalence in females, especially due to hormonal factors associated with estrogen and progesterone, which favor Supersaturation of bile and the formation of gallstones.

Among the medical records that included BMI data, it was observed that the majority Of the patients, one was above the recommended weight according to the WHO classification. Based on the valid data, 33.0% of individuals were eutrophic, while overweight (29.0%) and Grade I obesity (29.0%) together accounted for more than half of the records. Obesity categories grade II and III corresponded to smaller proportions (8.0% and 1.0%, respectively). respectively), and there were no cases of low weight. However, it is noteworthy that 68.1% of Medical records did not contain information about BMI, which limits interpretations (Table 2).

Table 2. Distribution of patients by BMI

Classification according to WHO	Frequency (n)	% valid	between	% in relation to the total (n=313)
Low weight (< 18.5)	0	0.0%		0.0%
Normal weight (18.5–24.9)	33	33.0%		10.5%
Overweight (25–29.9)	29	29.0%		9.3%
Obesity grade I (30–34.9)	29	29.0%		9.3%
Obesity grade II (35–39.9)	8	8.0%		2.6%
Obesity grade III (ÿ 40)	1	1.0%		0.3%
Total (valid)	**100**	**100%**		**31.9%**
Not informed	**208**		–	**68.1%**

Source: Prepared by the authors (2025).

The data available in Table 2 suggest that excess weight is a finding.
prevalent among patients undergoing cholecystectomy, consistent with the association already described as being associated with overweight, obesity, and an increased risk of cholelithiasis.

Analysis of the main diagnoses shows that cholecystitis was the primary cause.
The indication for cholecystectomy in the service accounts for 55.3% of cases, whether performed in isolation or associated with cholelithiasis, choledocholithiasis or pancreatitis. Uncomplicated cholelithiasis
This accounted for 25.2% of patients, making it the second most frequent group. The rest
Conditions showed lower participation: choledocholithiasis was present in 7.1% of cases.
In 3.9% of cases, biliary pancreatitis was observed, while cholangitis and neoplasia were not very common.
(1.6% and 0.6%, respectively), as well as diagnoses classified as "other"
(0.3%) (Table 3).

Table 3. Distribution of patients by primary diagnosis.

Main diagnosis	Description / associations included	(n)	(%)
Cholelithiasis	Isolated cases of cholelithiasis without inflammatory signs	78	25.2%
Cholecystitis	Includes isolated cholecystitis and associations with cholelithiasis, Pancreatitis, choledocholithiasis and variations (“Tokyo”, “complicated”, “emphysematous”)	171	55.3%
Choledocholithiasis	Includes isolated cases, and combinations with cholelithiasis, cholecystitis, and pancreatitis.	22	7.1%
Pancreatitis	Pancreatitis associated with cholelithiasis or choledocholithiasis	12	3.9%
Cholangitis	Includes isolated cholangitis and cholangitis associated with choledocholithiasis or neoplasia.	5	1.6%
Neoplasia	Gallbladder or periampullary neoplasm associated with cholelithiasis/cholangitis	2	0.6%
Other / Icteric syndrome	Icteric syndrome or unclassified findings	1	0.3%
Total	–	**308**	**100%**

Source: Prepared by the authors (2025).

The results presented in Table 3 demonstrate that the service handles
predominantly with acute inflammatory conditions of the gallbladder, followed by
Symptomatic uncomplicated cholelithiasis, a profile consistent with the practice of a public hospital.
Medium and high complexity services that meet both elective and emergency demands.

Analysis of comorbidities revealed that most patients undergoing
Cholecystectomy showed no record of associated diseases, corresponding to 59.2% of
medical records. Among those with some clinical condition, systemic arterial hypertension was the
the most frequent comorbidity (21.5%), followed by diabetes mellitus (9.1%), reflecting the
The pattern of most prevalent chronic diseases in the adult population (Table 4). It should be noted that
A single patient may have presented with more than one comorbidity.

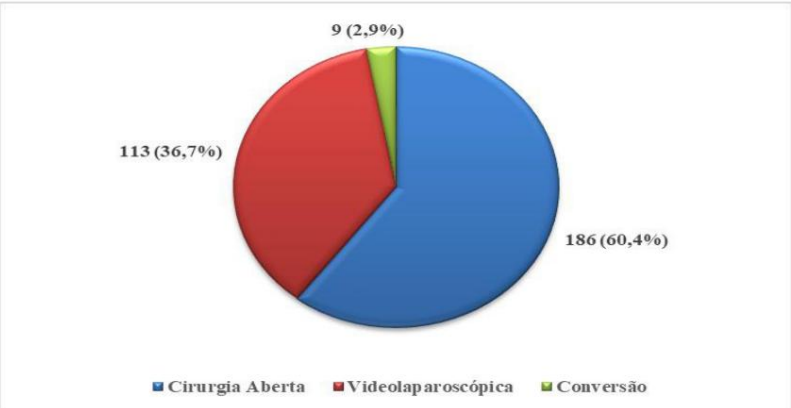
Table 4. Distribution of patients by comorbidities

Comorbidity Category Frequency (n) Percentage (%)	
Systemic arterial hypertension (SAH) 66 21.5%	
Diabetes mellitus (DM) 9.1%	28
Dyslipidemia / Hypercholesterolemia 1.3%	4
Endocrine diseases (hypothyroidism, etc.) 1.6%	5
Psychiatric/emotional illnesses 3.6%	11
Respiratory diseases (Asthma / COPD) 1.6%	5
Cardiovascular diseases (CAD, MI, stroke) 5 1.6%	
Associated gastrointestinal diseases 4 1.3%	
Other isolated comorbidities 3.6%	
No comorbidities: 59.2%	11,183

Source: Prepared by the authors (2025).

Analysis of the technique used in cholecystectomies revealed a predominance of open approach in the study period. Of the total procedures, 186 surgeries (60.4%) were performed using open technique, while 113 (36.7%) were conducted by videolaparoscopy. Conversion from videolaparoscopy to open technique occurred in 9 cases (2.9%). The rate of The observed conversion rate (2.9%) remained within the values described in previous studies, which They vary between 1% and 15%, depending on the clinical and intraoperative characteristics of the patients. (Chart 2).

Figure 2. Distribution by type of surgical technique.

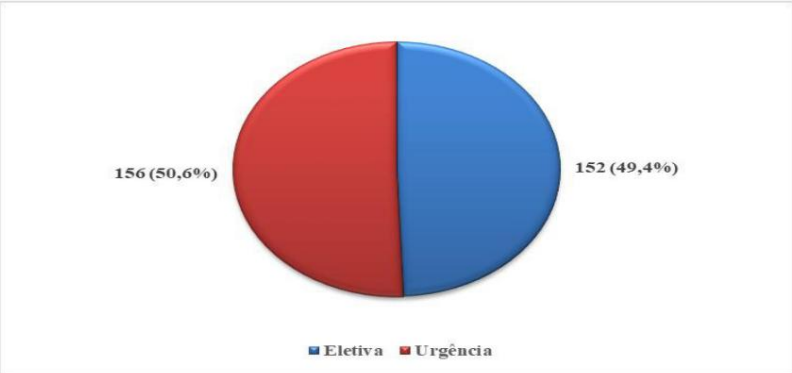


Source: Prepared by the authors (2025).

There was an association between diagnosis and surgical technique (chi-square, $p < 0.001$). A higher frequency of VLP was observed in cases of cholelithiasis than expected, while the Cases of cholelithiasis + cholecystitis showed a lower frequency of VLP and a higher frequency relative to open surgery.

The distribution of procedures according to surgical type showed proportions
Similarities exist between elective and emergency surgeries. Of the total cholecystectomies performed, 152 procedures (49.4%) were performed electively, while 156 (50.6%) were performed in an emergency context (Chart 3).

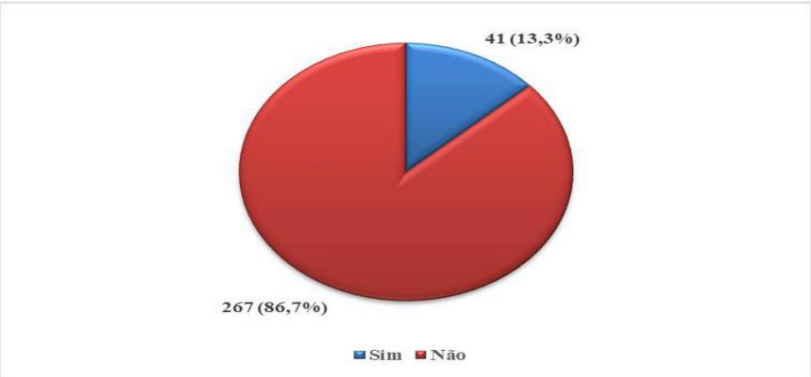
Figure 3. Distribution by type of surgery.



Source: Prepared by the authors (2025).

The analysis regarding the performance of endoscopic retrograde cholangiopancreatography. (CPRE) showed that only a small proportion of patients undergoing cholecystectomy underwent the procedure. Of the total evaluated, 13.3% had previously or during ERCP. the period related to the surgical intervention, while 86.7% did not undergo the technique. (Chart 4).

Figure 4. Distribution by ERCP procedure.



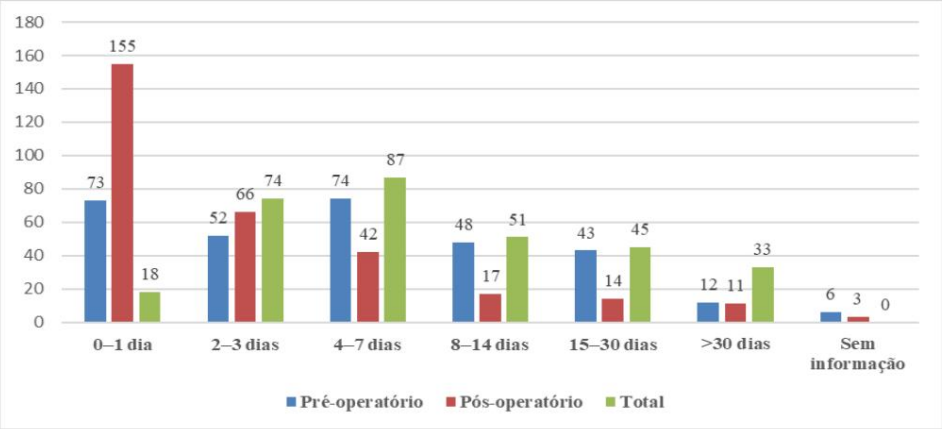
Source: Prepared by the authors (2025).

This pattern indicates that ERCP was used selectively and in a targeted manner. especially in cases with suspected or confirmed biliary obstruction, choledocholithiasis or other complications of the common biliary tract. The low frequency observed is consistent with

The targeted nature of the examination, which is generally reserved for specific conditions and does not comprise The routine for most cholecystectomies performed.

Variation in preoperative hospitalization time was observed among patients. patients who underwent cholecystectomy. In the preoperative period, the highest concentration occurred in The 4–7 day range (74 cases) was followed very closely by the 0–1 day range (73 cases) and the 2–3 day range (52 cases). A significant number of patients with stays between 8–14 days were also identified (48 cases) and 15–30 days (43 cases). Hospitalizations exceeding 30 days occurred in 12 cases, highlighting that a portion of the patients remained hospitalized for periods of time. prolonged periods before surgery, possibly due to clinical stabilization, need for additional tests, management of associated complications or limitations related to the availability of surgical centers (Graph 5). These data suggest the presence In more complex cases, clinical stabilization is necessary, and tests are required. complementary issues, regulatory difficulties, or limitations in the availability of operating rooms.

Figure 5. Distribution of patients by length of stay.



Source: Prepared by the authors (2025).

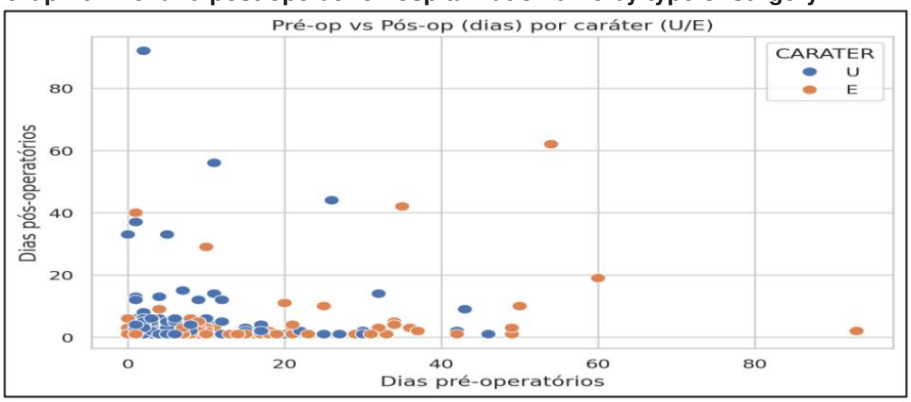
In the postoperative period, a marked predominance of short stays is observed, with 155 66 patients were discharged in 0–1 day and 66 in 2–3 days, which corresponds to approximately 71% of postoperative hospitalizations are concentrated in the first three days. This pattern reinforces that most surgeries resulted in rapid recovery and without significant complications. Prolonged postoperative hospital stays (>15 days) were less frequent, totaling 25. cases (14 in the 15–30 day range and 11 over 30 days), which represents about 8% of sample, indicating that the most complex or complicated cases corresponded to a minority of patients.

RCMOS - Multidisciplinary Scientific Journal The Knowledge.
ISSN: 2675-9128. São Paulo-SP.

When analyzing the total length of hospital stay, a more...
concentrated in the intermediate age ranges, especially between 4–7 days (87 cases) and 2–3 days (74 cases), followed by 8–14 days (51 cases) and 15–30 days (45 cases). Total hospitalizations exceeding Symptoms within 30 days occurred in 33 patients. This behavior highlights the cumulative impact of preoperative period regarding total hospital stay, reflecting that, in some cases, The waiting time before surgery contributed significantly to the overall duration of the procedure. hospitalization. From this data it is possible to verify that the total hospitalization time is influenced by the pre-operative period, while the post-operative period tends to be shorter and homogeneous, reinforcing the hypothesis that organizational and clinical factors prior to surgery They play a central role in the overall length of hospitalization.

When analyzing the pre-operative, post-operative, and total (pre+post) hospitalization times, It was observed that, in elective surgeries (E), the preoperative time was the main component. of the total time. In elective surgeries, a greater dispersion of values was observed in the pre-surgery period. The average operative recovery time was 10.7 ± 15.1 days, while the average postoperative hospital stay was... In general, shorter and concentrated in low values, with an average of 3.1 ± 7.3 days. A The correlation between pre- and post-operative times in this group was weak, indicating that the duration The length of hospital stay after surgery did not directly depend on the previous waiting time for the procedure (Chart 6).

Graph 6. Pre- and post-operative hospitalization time by type of surgery.



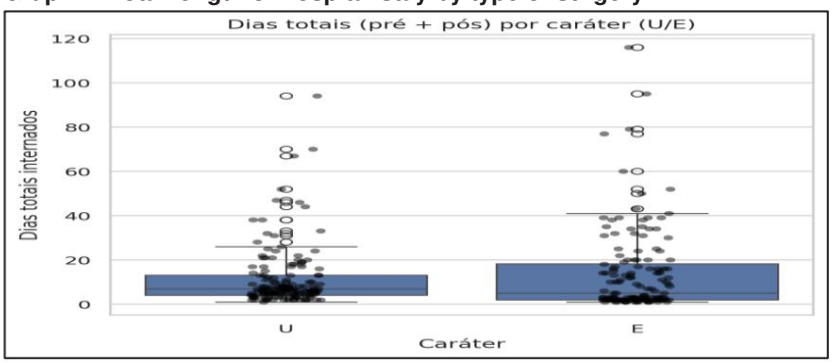
Source: Prepared by the authors (2025).

In emergency surgeries, the preoperative hospitalization time was shorter, averaging... 6.8 ± 8.4 days, while the postoperative period showed slightly higher values. high, with an average of 4.6 ± 10.3 days (Graph 5). When analyzing the association between the different Regarding hospitalization times, it was observed that, in emergency surgeries, the correlation between the periods Pre- and post-operative differences were practically nonexistent, as indicated by Pearson's coefficient (r = 0.033).

as well as Spearman's rank correlation coefficient (ÿ = ÿ0.022), indicating the absence of a linear or monotonic relationship.
between the length of hospital stay before surgery and the length of hospital stay after surgery.
procedure in this group. In elective surgeries, this association was slight, with correlation.
weak to moderate difference between the pre- and post-operative periods (r = 0.301; ÿ = 0.258), suggesting
only a limited tendency for increased postoperative time as it is prolonged
The preoperative period.

When considering the total length of hospital stay, it was observed that, in elective surgeries, the
The length of hospitalization was determined by the preoperative time, resulting in a total average.
13.9 ± 18.7 days. This finding indicates that, in this group, most of the stay
Hospital admission occurred before the surgical procedure was performed. On the other hand, in surgeries
In the case of emergency care, the total length of stay was 11.4 ± 13.5 days and showed an association with both
both the pre- and post-operative periods suggest a more balanced contribution from both.
The timelines for the duration of hospitalization (Graph 7).

Graph 7. Total length of hospital stay by type of surgery.



Source: Prepared by the authors (2025).

It is noteworthy that in emergency surgeries, the total time showed a moderate correlation.
the correlation was strong both in the preoperative period (r = 0.647; ÿ = 0.794) and in the postoperative period.
(r = 0.784; ÿ = 0.439), indicating that, in this context, both components contribute in
A relevant factor in the variation of the total length of hospitalization.

The distribution of surgical time revealed wide variability in the duration of
cholecystectomies, with a significant concentration of procedures in intermediate ranges and
prolonged. It is observed that a significant portion of the surgeries exceeded two hours.
duration (16.6%), and 22.2% extended for more than four hours, indicating the presence of cases
technically more complex and possibly associated with advanced inflammation, adhesions,
anatomical distortions or the need for additional procedures. On the other hand, a fraction

RCMOS – Multidisciplinary Scientific Journal The Knowledge.
ISSN: 2675-9128. São Paulo-SP.

The smallest of the procedures was completed in less than 90 minutes (7.8%), suggesting that only Some of the cases presented a lower degree of technical difficulty (Table 5).

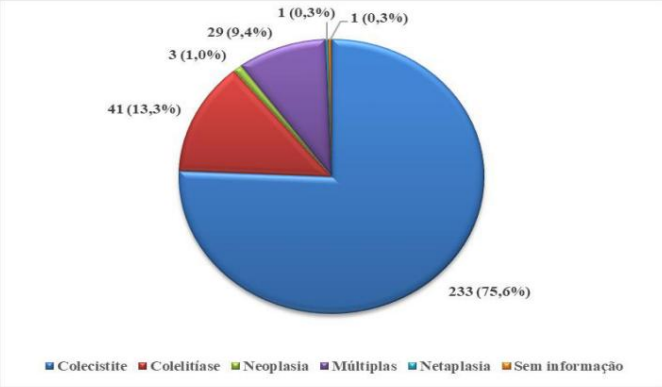
Table 5. Distribution by surgery time

Range (min) < 90	n	%
min 24 90–119 min 69 120–149 min 51 150–		7.8%
179 min 49 180–239 min 45 ÿ240 min 68		22.5%
No information 2 Total valid 306 **Source:**		16.6%
Prepared by the authors (2025).		16.0%
		14.7%
		22.2%
		1.0%
		100%

This highlights the heterogeneous profile of the service's case studies, which includes both From simpler cases to more complex situations, compatible with the The role of a public hospital that handles elective and, above all, emergency cases. The broad The dispersion of operating times is also consistent with the observation of longer durations. in converted cases and with a higher complication rate, as demonstrated in the analyses. by surgical technique.

Histopathological findings revealed a marked predominance of cholecystitis as final diagnosis, present in 75.6% of the samples analyzed. This percentage reinforces the relevance of inflammatory processes of the gallbladder as a primary surgical indication in service, including both acute and chronic forms, as can be seen in Graph 8.

Figure 8. Distribution by histopathological examination result.



Source: Prepared by the authors (2025).

As can be seen in Graph 8, uncomplicated cholelithiasis was identified in 13.3% of cases, representing situations where surgery was motivated by symptoms or risk of complications, even in the absence of significant inflammation. Anatomopathological examination. Finally, changes consistent with neoplasia were observed. In 1.0% of surgical specimens, a low proportion, but consistent with the rarity of gallbladder tumors. biliary in clinical practice.

Most patients progressed without any recorded complications, with no reported incidents. Complications occurred in 87.6% of cases. Among those who experienced an adverse event, Biliary infections and hepatic complications (bilioma, abscess, predominated) residual choledocholithiasis), which accounted for 5.2% of the sample, followed by episodes of sepsis and septic shock (1.9%). The other categories showed a similar frequency, in around 1.0%–1.2% each (Table 6).

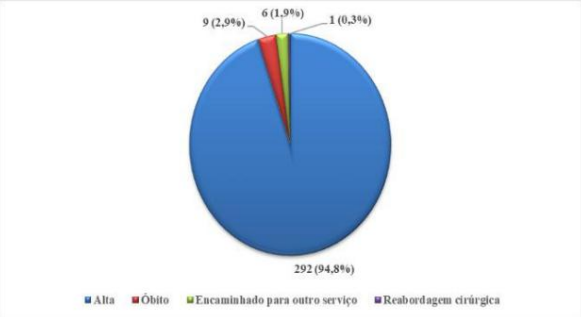
Table 6. Distribution by complication

Complication	Frequency (n)	Percentage (%)
No complications reported	270	87.6%
Biliary infections and liver complications	16	5.2%
Sepsis and septic shock	6	1.9%
Respiratory and infectious complications associated	3	1.0%
Metabolic and hematological complications	3	1.0%
Local surgical complications	4	1.2%
Digestive complications	3	1.0%
Other isolated complications	3	1.0%
Total (valid)	308	100%

Source: Prepared by the authors (2025).

The majority of patients were discharged from the hospital, representing 94.8% of the total. cases, which indicates adequate resolution of the clinical picture in most hospitalizations. Deaths They accounted for 2.9%, a percentage concentrated mainly among patients with conditions... more serious clinical symptoms, often associated with complicated cholecystitis and biliary tract infections. extensive or septic evolution. In addition, 1.9% of patients were referred to another service, usually for continuity of specialized care, such as advanced management of Biliary complications, intensive care support, or further investigation. Cases requiring re-intervention. Surgical intervention occurred in 0.3% of cases (Graph 9).

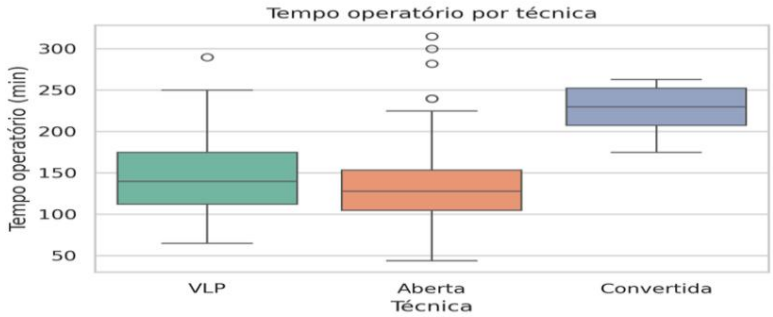
Figure 9. Distribution by outcome



Source: Prepared by the authors (2025).

Analysis of the operating time revealed clear differences between the three techniques. evaluated, as can be seen in Graph 10.

Figure 10. Operative time by surgical technique



Source: Prepared by the authors (2025).

These results demonstrate that videolaparoscopy (VLP) has shown faster results. lower medians, concentrating around approximately 140 minutes, with wider variation, including some high values that may reflect complex cases or

The need for additional intraoperative procedures. The observed dispersion suggests the need for additional intraoperative procedures.

heterogeneity in the profile of cases addressed through this route.

In the open technique, the median operative time was slightly shorter than in the VLP. settling close to 130 minutes, although with a smaller interquartile range. This pattern indicates greater uniformity of times, possibly related to the adoption of this technique in More defined or restricted clinical scenarios exist, but extreme values still coexist. These represent more complex cases.

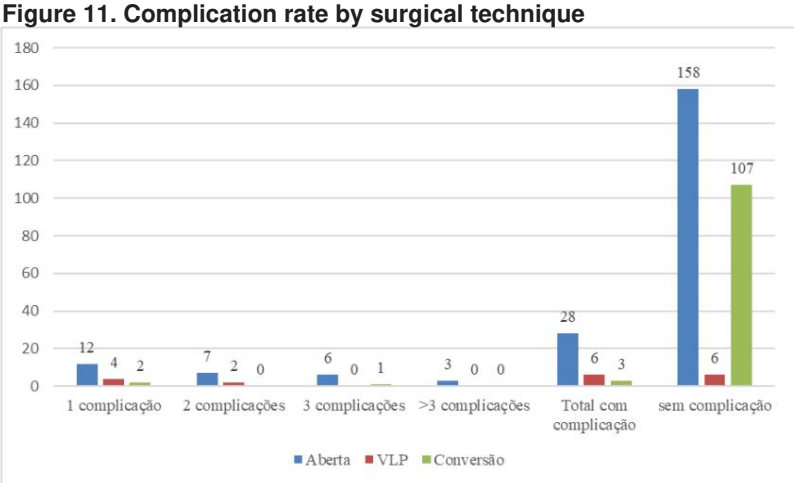
Converted surgeries had the longest operating times, with a median around 230 minutes and less relative variability between cases. This result is consistent with the fact that conversion often stems from technical difficulties, severe inflammation, anatomical distortion, or intraoperative complications, prolonging substantially the duration of the procedure.

In cases where there was a conversion from videolaparoscopy to the open technique, the age The average age of the patients was 50.1 years, with a predominance of females (7 women and 2 men). (men), partially reflecting the general profile of the sample. Among the records with registration Using a valid BMI (n=6), an average value of 28.95 kg/m² was observed, placing these patients in The majority of them were in the overweight range. Regarding the nature of the surgery, the conversions occurred both... in both emergency and elective procedures, with a slight predominance of emergencies (5 (cases) in relation to electives (4 cases), suggesting that the need for conversion is not It is restricted to a single care context, but is primarily associated with complexity. Intraoperative. Regarding the primary diagnosis, cholecystitis was the most common condition. frequently associated with converted cases (5 cases), reinforcing the role of processes acute inflammatory conditions and associated anatomical changes are factors that hinder the Laparoscopic dissection increases the likelihood of changing the access route.

Therefore, no statistically significant associations were identified between the preoperative clinical and demographic variables assessed and the occurrence of conversion surgical. On the other hand, an association was observed between conversion and longer operating time and longer postoperative hospital stay, findings consistent with greater complexity intraoperative risk and increased postoperative morbidity.

Analysis of complication rates according to surgical technique reveals differences. Significant differences emerged between the groups evaluated. The VLP group presented the lowest proportion of complications. with an approximate rate of 5%, reaffirming its profile of greater security in the studied context. (Graph 11). This result is consistent with the literature, which describes lower morbidity. associated with minimally invasive access.

Figure 11. Complication rate by surgical technique



Source: Prepared by the author (2025).

The analysis of the number of complications according to the surgical technique showed Significant differences between the groups. Open surgery accounted for the largest absolute number of patients with adverse events (n=28). In addition to a higher overall frequency, the open technique It also showed a higher number of patients with multiple complications (ÿ2 events). indicating a higher burden of morbidity in this group.

In the VLP (Visual Laboratories Program), 6 patients with complications were recorded, with cases predominantly involving... only 1 event (4 patients) and 2 complications (2 patients), with no occurrence of three or more events. Among the converted cases, 3 patients presented complications, 2 of which had 1 event and 1 with 3 events. In general, a smaller number and less multiplicity of events is observed. complications in VLP when compared to open surgery, while converted cases, Although less frequent, they presented a distribution consistent with greater complexity. clinic.

4. Discussion

This study outlined the profile of cholecystectomies performed in a hospital. public of the Federal District, highlighting a healthcare scenario marked by high demand for inflammatory cases, a significant volume of emergency surgeries, and a predominance of open technique, in contrast to the trend described in the international literature of broad adoption of videolaparoscopy as the preferred approach.

The volume of care provided remained stable throughout the analyzed period. with an approximate average of 12.8 procedures per month, with no significant variations between 2023, 2024 and the beginning of 2025. This regularity suggests that the service operates on continuous demand and predictable, which is consistent with the epidemiological profile of biliary disease in the population. adult. Recent studies in public health systems also describe behavior. similar, with relatively constant volumes of cholecystectomy throughout the year, reflecting both the high prevalence of cholelithiasis and the recurrent nature of the complications. Inflammatory conditions that require surgical hospitalization (Campbell et al., 2023; Hajong et al., 2021). The stability of the volume reinforces that the findings of the present study do not reflect a period. Not atypical, but rather the routine operation of the service.

The predominance of female patients and in the age range between the fourth and sixth decades of life is consistent with the classic epidemiological pattern of cholelithiasis, recognized in population studies, in which hormonal, metabolic and

Reproductive factors play a central role in the pathophysiology of biliary disease. The elevated
The proportion of women in the sample reinforces this profile.

Irigonhê et al. (2020), when evaluating 389 patients who underwent cholecystectomy
Videolaparoscopic surgery at a university hospital in Curitiba observed a demographic profile.
similar, with a predominance of females and an average age of 51.5 years, in addition to high
frequency of overweight and obesity. In this study, 58.8% of patients presented with overweight and obesity.
less than one comorbidity and 74.6% were overweight, reinforcing the association between
metabolic disorders and biliary disease. The authors also demonstrated that advanced age,
The presence of comorbidities, hypertension, and diabetes mellitus were significantly
associated with worse hospital outcomes, including longer hospital stays, need
intensive care, higher conversion rate to open surgery, and higher incidence of
Postoperative complications.

From a clinical point of view, it is noteworthy that more than half of the indications
Surgical intervention has been linked to cholecystitis, both in isolated forms and in those associated with other conditions.
other complications. This finding is consistent with what current guidelines describe, such as
as *Tokyo Guidelines* (Wakabayashi et al., 2018), which identify acute cholecystitis as a
One of the main causes of surgical hospitalization for biliary disease. The predominance of diagnoses
Inflammatory factors also help explain the high proportion of procedures performed in
emergency regime observed in the service.

Despite the consolidation of videolaparoscopy as the gold standard for the treatment of
While cholelithiasis is prevalent in various countries, this study identified a predominance of open surgery.
This data suggests that the care profile of the hospital analyzed is geared towards...
handling more complex cases, with a higher degree of inflammation, anatomical distortion and
Intraoperative risk, in addition to possibly reflecting structural limitations, availability
Intermittent equipment or institutional care pathway characteristics. Studies such as
Coccolini et al. (2015) and Smiley et al. (2023) already highlight that, especially in contexts
In public systems and in middle-income countries, the full incorporation of laparoscopy may
to be heterogeneous and dependent on organizational factors.

Statistical analysis confirmed this interpretation by demonstrating an association.
significant difference between diagnosis and surgical technique employed, with a higher frequency of
Videolaparoscopy in cases of uncomplicated cholelithiasis and a higher relative proportion of
Open surgery is being used in cases of cholelithiasis associated with cholecystitis. This finding is currently being studied.
consistent with recent literature, which demonstrates that the degree of inflammation, the presence of
Edema, fibrosis, and anatomical distortion of Calot's triangle are central determinants of

technical difficulty and choice of access route (Morales-Maza et al., 2021; Avci et al., 2024; Nassar et al., 2022). Thus, more than an institutional preference, the greater use of The open technique appears to reflect a rational adaptation to the more severe inflammatory profile of the cases. attended.

The conversion rate observed in the study remained within the range described in International literature suggests appropriate indication for the laparoscopic approach and recognition. timely in situations of greater risk. Katwal et al. (2022), in a cross-sectional study conducted in a tertiary center in Nepal with 345 patients initially undergoing cholecystectomy videolaparoscopic surgery identified a prevalence of conversion to open surgery of only 1.73%. Although slightly lower than that found in the present sample, this difference may be explained by the profile of the cases included, since the Nepalese study exclusively evaluated elective procedures, while the present study includes a significant proportion of surgeries. of urgency and more complex inflammatory conditions. Still, both findings reinforce that conversion is a relatively infrequent event, but strongly associated with greater Technical difficulty, pronounced local inflammation, and increased risk of complications.

No statistically significant associations were identified between the variables. Preoperative clinical and demographic data were assessed, and the occurrence of conversion to Videolaparoscopy for the open technique. This finding suggests that, in the context studied, the The decision to convert was less related to the patient's baseline characteristics and more linked to intraoperative factors, such as the degree of inflammation, anatomical distortion, and adhesions. dense or technical difficulties not fully predictable pre-operatively. This result is Consistent with recent literature, which points to important limitations in the ability of models... exclusively clinical or laboratory-based methods in consistently predicting the need for conversion, reinforcing that it remains, to a large extent, a decision dependent on dynamic assessment by the surgeon during the surgical procedure (Morales-Maza et al., 2021; Avci et al., 2024; Nassar et al., 2022).

In the same vein, Nassar et al. (2022), in a prospective analysis of 5,738 Laparoscopic cholecystectomies performed over 28 years showed a rate of extremely low conversion rate (0.49%), achieved at the cost of high surgical specialization and systematic use of salvage strategies, such as *fundus-first* dissection and cholecystectomy subtotal. Nevertheless, the authors reported high morbidity among converted cases. (33%), a finding that converges with the data from the present study, in which the procedures Converted patients experienced longer operating times and a higher complication rate. The main The causes of conversion described by Nassar et al. (2022) were dense adhesions and calculi.

impacted in the biliary tract, conditions that also reflect greater inflammatory severity and Anatomical distortion reinforces the idea that conversion is more associated with the complexity of the case. more to the technique itself.

Analysis of operative time reinforces this interpretation: converted surgeries They presented the longest surgical times, which is expected, given the conversion It usually occurs in scenarios of advanced inflammation, dense adhesions, bleeding, or difficulty in reliably identifying the structures of the hepatic hilum. This behavior has already been described by Warchaÿowski et al. (2020) when analyzing predictive factors of conversion and increased morbidity.

The clinical characterization of patients who progressed to conversion reinforces this. interpretation. In this subgroup, inflammatory conditions predominated, especially cholecystitis, in addition to a tendency towards longer operating times and longer recovery times. postoperative hospitalization, even though no clinical predictors have been identified or statistically significant preoperative demographic findings. This finding is consistent with Recent studies show that, although several factors may be associated with conversion in univariate analyses, many of them lose significance in multivariate models, reinforcing that conversion is often determined by intraoperative findings and the actual technical difficulty encountered in the operating field (Morales-Maza et al., 2021; Avci et al., 2024; Nassar et al., 2022). Thus, conversion should be understood less as a failure. It's a technique, but also a security strategy when faced with high-risk scenarios.

Patel et al. (2025), in a retrospective cohort study with 272 patients, They demonstrated that the converted cases presented a significantly shorter operating time. greater, higher complication rate (30.6% versus 11.2%) and longer hospital stay. Hospital costs when compared to procedures completed via laparoscopy. The authors also observed that the use of drains was much more frequent in these cases. converted, without a significant reduction in complications, but with a negative impact on time. of hospitalization, suggesting that conversion, more than the use of drains itself, reflects a greater Surgical complexity and greater tissue damage are factors that contribute to poorer outcomes. post-operative.

Regarding complications, most patients recovered without incident. which indicates good overall performance of the service, despite the potentially more challenging clinical profile. severe in part of the sample. However, a clear risk gradient was observed according to the Technique used: videolaparoscopy presented the lowest complication rates, followed by open surgery was the most common outcome, while converted cases showed the highest event rates.

adverse. This finding reinforces the understanding that conversion is not a cause, but a marker.
of greater surgical complexity and clinical severity, being associated with worse outcomes,
Longer operating time and greater morbidity, as described in multiple series.

Campbell et al. (2023) demonstrated that both laparoscopy and surgery
Robotic surgery has shown superior outcomes compared to open surgery, with lower rates of...
complications and shorter hospital stay. Although laparoscopy has
Although both presented shorter operating times compared to robotic surgery, they showed good performance.
significantly better than the open technique.

A possible pathophysiological mechanism to explain the observed differences between
Surgical techniques may be related to the intensity of the systemic inflammatory response.
to surgical trauma. In this sense, Naqvi et al. (2017), in a prospective study comparing
Laparoscopic and open cholecystectomy studies have shown that open surgery is associated with
significantly higher elevation of pro-inflammatory and anti-inflammatory cytokines, such as
interleukin-1ÿ, interleukin-10, and tumor necrosis factor alpha, both in the first few hours.
as well as 24 hours after the procedure. In addition, patients undergoing the laparoscopic approach
They presented lower pain scores in the immediate postoperative period. These findings provide a basis.
biological basis for the results observed in the present study, in which videolaparoscopy
It presented a lower complication rate, while open surgery, and especially in certain cases...
Converted patients experienced greater morbidity. The lower tissue damage inherent in the technique.
Minimally invasive procedures appear to result in less systemic inflammatory stress and faster recovery.
faster and with a lower risk of infectious and clinical complications, which reinforces the
Videolaparoscopy as the preferred approach whenever technically feasible.

Furthermore, studies that specifically assess surgical site infection reinforce this.
the differences in morbidity between the techniques. Hajong et al. (2021), in a cross-sectional study
with more than 1,500 patients undergoing cholecystectomy, they demonstrated that the overall rate of
Infection was significantly lower in videolaparoscopy (1.94%) when compared to
open surgery (7.43%). The authors identified the following factors associated with increased risk:
Risk factors include infection, increased age, longer procedure duration, and greater blood loss.
intraoperative, performance of surgery on an emergency basis, presence of acute cholecystitis and
Bile leakage during surgery.

From this, the importance of pre-operative identification of risk factors becomes clear.
The risk of conversion is also highlighted by Morales-Maza et al. (2021), who analyzed 321
patients with acute cholecystitis according to the Tokyo Guidelines criteria and found a rate
conversion rate of 12.1%. In this study, older age, male sex, and thickness of the

Gallbladder wall tissue remained independent predictors of conversion in the analysis.
multivariate. The authors further demonstrated that the combination of these factors presented
High sensitivity for predicting surgical difficulty.

Analysis of pre- and post-operative hospital stay times revealed the coexistence of two
Distinct care flows: a significant group of patients requiring rapid resolution, both
before as well as after surgery, and another group that remains hospitalized for periods of time.
prolonged, especially in the preoperative period. This pattern suggests that, in addition to the severity
Clinical factors, organizational factors such as regulation, bed availability, and examinations.
Complementary services and access to surgical centers also influence the length of stay.
Hospital costs, which have a direct impact on bed occupancy and system efficiency.

The data reinforces this interpretation by showing that, in elective surgeries, the time of
Total hospitalization was predominantly determined by preoperative length of stay.
while the postoperative period generally remained short and with little variation. This pattern suggests
in this group, organizational factors exert a more significant influence on the duration of
Hospitalization is more important than the actual postoperative clinical recovery. In contrast, in
In emergency surgeries, the total length of stay proved to be dependent on both the pre-operative period and the period before the surgery.
as well as the postoperative period, indicating that, in this scenario, the clinical severity, the complexity of
The procedure and the occurrence of postoperative complications become more important in...
Determining the length of hospital stay. Contemporary studies indicate
Similar results show that, in emergency settings, the length of hospital stay...
It reflects the severity of the condition and perioperative morbidity more directly than just...
logistical factors (Campbell et al., 2023; Patel et al., 2025).

The low frequency of ERCP procedures is consistent with its indication.
selective, mainly restricted to cases with suspected or confirmed choledocholithiasis or
cholangitis, and reinforces that most patients were managed effectively with only...
cholecystectomy.

The low frequency of ERCP observed in the present study is consistent with the use
selective procedure, aligned with contemporary risk stratification strategies for
Choledocholithiasis/cholangitis. In patients with intermediate suspicion of choledocholithiasis,
European recommendations (ESGE) indicate the use of EUS or MRCP for confirmation.
Diagnostic testing is performed before indicating ERCP, reserving therapeutic intervention for cases with calculi.
Documented or persistent clinical suspicion. Recent trials in a probability setting.
Intermediate studies demonstrate that this approach reduces unnecessary ERCPs by directing the...
This procedure is for patients with the highest likelihood of benefit. Thus, the proportion

The reduced use of ERCP in the service tends to reflect a practice of indication directed towards complications. of the common bile duct, while most cases are managed effectively with the cholecystectomy (Jagtap et al., 2022).

From an anatomopathological point of view, the predominance of inflammatory findings confirms that many patients arrive for surgical treatment at more advanced stages of the disease. disease, which again relates to the high percentage of emergency surgeries and the profile of greater clinical complexity observed in the service.

Among the study's limitations, its retrospective nature and dependence on... stand out. The quality of records in medical charts and the high proportion of missing data for some variables, such as BMI. These limitations restrict some inferences, but not They compromise the overall characterization of the care profile and the main outcomes. surgical.

Final Considerations

Based on the study conducted, it was possible to outline the profile of cholecystectomies. conducted in a public hospital in the Federal District, highlighting a healthcare setting. characterized by a higher proportion of emergency cases, predominance of female patients female, age concentration in middle-aged groups and high frequency of cases Inflammatory gallbladder disease is the primary surgical indication. A predominance was observed. of the open technique, contrasting with the standard advocated in the international literature, which reflects both the more complex clinical characteristics of the patients treated and the structural and organizational particularities of the service.

The choice of surgical technique proved to be strongly associated with the clinical context and depending on the severity of the cases, the open approach was more frequently employed in patients. with advanced inflammatory conditions, longer preoperative hospital stay, greater anatomical complexity and a higher burden of comorbidities, whereas videolaparoscopy was most commonly used in more stable scenarios, with less inflammatory involvement and better general clinical condition. The cases that progressed to conversion concentrated the longest timeframes. operative procedures and higher complication rates confirm that conversion is a marker Indirect factors include technical difficulty and disease severity.

When used, videolaparoscopy showed better indicators of performance, with lower complication rates and shorter postoperative hospital stay, confirming its profile of greater security and efficiency. On the other hand, the cases submitted to

Conversion surgery or open surgery were associated with greater clinical severity and longer operative duration. and a higher risk of adverse events, reinforcing that these approaches are strongly associated to scenarios of greater anatomical and inflammatory complexity.

The results also showed that most patients progressed in a way favorable, with early discharges and a low overall complication rate, despite the significant workload. of urgent and complex cases. The need for prolonged pre-operative hospitalizations of The sample, however, suggests challenges related to the regulation of surgical access, to availability of resources and the need for prior clinical stabilization in older patients serious.

At the end of the study, it is possible to highlight the importance of strategies focused on Strengthening the laparoscopic approach, improving the early management of acute cholecystitis, and... improving the organization of care flows, in order to reduce the need for More invasive approaches, minimizing complications and optimizing the use of hospital resources. Knowledge of the local profile presented in this study can contribute to planning. institutional and for the continuous improvement of the quality of care provided to patients. undergoing cholecystectomy within the public health system.

References

AVCI, MEHMET ALPEREN et al. *Can hemogram parameters and derived ratios predict conversion from laparoscopic to open cholecystectomy?* Cureus, vol. 16, no. 8, 2024.

CAMPBELL, STEPHEN et al. *A retrospective study of laparoscopic, robotic-assisted, and open emergent/urgent cholecystectomy based on the PINC AI Healthcare Database 2017–2020.* World Journal of Emergency Surgery, v. 18, no. 1, p. 55, 2023.

COCCOLINI, FEDERICO et al. *Open versus laparoscopic cholecystectomy in acute cholecystitis: systematic review and meta-analysis.* International Journal of Surgery, vol. 18, p. 196–204, 2015.

HAJONG, RANENDRA et al. *A cross-sectional study of risk factors for surgical site infections after laparoscopic and open cholecystectomy in a tertiary care hospital in North East India.* Journal of Family Medicine and Primary Care, vol. 10, no. 1, p. 339–342, 2021.

HANSON-VIANA, ERIK et al. *The association of preoperative risk factors for laparoscopic conversion to open surgery in elective cholecystectomy.* Euroasian Journal of Hepato-Gastroenterology, v. 12, no. 1, p. 6, 2022.

IRIGONHÊ, ALAN TIBÉRIO DALPIAZ et al. *Epidemiological and clinical assessment of patients undergoing videolaparoscopic cholecystectomy at a Curitiba teaching hospital.* Journal of the Brazilian College of Surgeons, v. 47, p. e20202388, 2020.

JAGTAP, NITIN et al. *EUS versus MRCP to perform ERCP in patients with intermediate likelihood of choledocholithiasis: a randomized controlled trial.* Gut, vol. 71, no. 10, p. 2005–2010, 2022.

KATWAL, GAURAV et al. *Open cholecystectomy among patients undergoing laparoscopic cholecystectomy in a tertiary care center: a descriptive cross-sectional study.* JNMA: Journal of the Nepal Medical Association, vol. 60, n. 249, p. 444, 2022.

LIO, ROBERTA et al. *Preoperative risk factors for conversion from laparoscopic to open cholecystectomy: a systematic review and meta-analysis.* International Journal of Environmental Research and Public Health, vol. 20, no. 1, p. 408, 2022.

MORALES-MAZA, JESÚS et al. *Conversion from laparoscopic to open cholecystectomy: risk factor analysis based on clinical, laboratory, and ultrasound parameters.* Revista de Gastroenterología de México, v. 86, no. 4, p. 363–369, 2021.

NAQVI, SAYYED EHTESHAM HUSSAIN et al. *A prospective study of altered inflammatory response and its clinical outcome following laparoscopic and open cholecystectomy.* Iranian Journal of Medical Sciences, vol. 42, no. 4, p. 347, 2017.

NASSAR, AHMAD HM et al. *Open conversion in laparoscopic cholecystectomy and bile duct exploration: subspecialization safely reduces the conversion rates.* Surgical Endoscopy, vol. 36, no. 1, p. 550–558, 2022.

PATEL, PARIN Y. et al. *Outcomes and drain use in laparoscopic vs. converted open cholecystectomy cases: a retrospective cohort study.* Cureus, vol. 17, no. 9, 2025.

SMILEY, KATHERINE E. et al. *An outcomes-focused analysis of laparoscopic and open surgery in a Nigerian hospital.* JSLS: Journal of the Society of Laparoscopic & Robotic Surgeons, vol. 27, no. 1, p. e202200081, 2023.

WAKABAYASHI, GO et al. *Tokyo Guidelines 2018: surgical management of acute cholecystitis: safe steps in laparoscopic cholecystectomy for acute cholecystitis.* Journal of Hepato-Biliary-Pancreatic Sciences, v. 25, no. 1, p. 73–86, 2018.

WARCHAÿOWSKI, ÿUKASZ et al. *The analysis of risk factors in the conversion from laparoscopic to open cholecystectomy.* International Journal of Environmental Research and Public Health, vol. 17, no. 20, p. 7571, 2020.